

First record of *Psallus assimilis* in Hungary (Hemiptera: Heteroptera: Miridae)

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Abstract. The presence of *Psallus assimilis* Stichel, 1956 (Hemiptera: Heteroptera: Miridae) is reported for the first time from Hungary. Specimens were collected from the canopy of field maple (*Acer campestre* L.) trees in Budapest, Diósd and Törökbalint in spring of 2015, 2016 and 2017. Our study indicates that *P. assimilis* is one of the most abundant heteropteran species in the canopy of field maple trees not only in suburban and urban forests but also on individual street trees in highly urbanized locations in Budapest. We provide photographs of the habitus and diagnostic characters of adults.

Keywords. Heteroptera, *Acer campestre*, urban areas, distribution, faunistics.

INTRODUCTION

Psallus Fieber, 1858 is one of the largest genera of Miridae (Hemiptera: Heteroptera); it comprises almost 140 species in the Palearctic Region (Kerzhner & Josifov 1999, Aukema *et al.* 2013), 23 of which have also been recorded from Hungary. Eleven of these species, *e.g.* *P. anaemicus*, *P. helenae* and *P. pardalis*, were recorded during the last twenty-five years (Kondorosy 1999, 2005, 2011, 2012).

Psallus species are primarily zoophytophagous in the adult stage. Young nymphs feed on pollen, therefore they can only be found on mature, fertile host plants. Later nymphal stages become predatory, and prey mainly on mites and aphids, but also on other insects, *e.g.* scale insects, psyllids and caterpillars (Wachmann *et al.* 2004), or eggs of leaf beetles (Björkman *et al.* 2009). Many species of this genus are associated with oak trees (*Quercus* spp.), while other species are found on other deciduous and coniferous trees and shrubs (*e.g.* *Picea*, *Larix*, *Fraxinus* and *Fagus* spp.) (Wachmann *et al.* 2004, Goßner 2008).

MATERIAL AND METHODS

The arthropod community in the canopies of field maple (*Acer campestre* L.) trees was surveyed in 23 locations of Budapest, Hungary: Alkotás utca (47°29'22.6"N, 19°01'27.6"E, 142 m a.s.l.), Botanical Garden Buda (47°28'49.4"N, 19°02'12.6"E, 113 m a.s.l.), Csillebérc (47°29'25.1"N, 18°57'39.4"E, 447 m a.s.l.), Farkasvölgy (47°29'05.0"N, 18°59'09.4"E, 304 m a.s.l.), Gelért-hegy (47°29'09.3"N, 19°02'51.1"E, 187 m a.s.l.), Haller park (47°28'28.5"N, 19°04'49.0"E, 107 m a.s.l.), Hegyalja út (47°29'07.7"N, 19°01'00.3"E, 193 m a.s.l.), Hunyadi tér (47°30'21.3"N, 19°04'00.2"E, 104 m a.s.l.), Húvösvölgy (47°32'30.7"N, 18°57'49.5"E, 227 m a.s.l.), Karolina út (47°28'45.6"N, 19°01'53.5"E, 110 m a.s.l.), Keleti Pályaudvar (47°29'59.3"N, 19°05'03.1"E, 109 m a.s.l.), Ludovika tér (47°28'55.1"N, 19°05'01.6"E, 110 m a.s.l.), Margit-sziget (47°31'24.9"N, 19°02'9.8"E, 104 m a.s.l.), Mátyás tér (47°29'31.6"N, 19°04'45.3"E, 105 m a.s.l.), Normafa (47°30'24.1"N, 18°57'42.5"E, 460 m a.s.l.), Rácz Aladár út (47°28'59.2"N, 18°59'43.9"E, 253 m a.s.l.), Rákóczi tér (47°29'33.8"N, 19°04'19.8"E, 104 m a.s.l.).

a.s.l.), Róbert Károly körút ($47^{\circ}32'08.5''N$, $19^{\circ}03'47.4''E$, 107 m a.s.l.), Szent István park ($47^{\circ}31'07.6''N$, $19^{\circ}03'03.9''E$, 105 m a.s.l.), Széchenyi-hegy ($47^{\circ}29'42.4''N$, $18^{\circ}58'30.5''E$, 461 m a.s.l.), Városmajor ($47^{\circ}30'30.6''N$, $19^{\circ}01'02.2''E$, 135 m a.s.l.), Vérmező ($47^{\circ}30'05.0''N$, $19^{\circ}01'31.7''E$, 125 m a.s.l.), Zugligeti út ($47^{\circ}31'03.9''N$, $18^{\circ}59'09.3''E$, 180 m a.s.l.) and in Diósd ($47^{\circ}24'44.2''N$, $18^{\circ}56'17.5''E$, 165 m a.s.l.) and Törökbálint ($47^{\circ}25'58.2''N$, $18^{\circ}55'37.0''E$, 182 m a.s.l.).

Tree canopies were sampled monthly from April to October in 2015, 2016 and 2017. Arthropods were collected by beating the branches of each sampled field maple trees over beating umbrella. Samples were stored in 70% ethanol, heteropterans were examined in the laboratory of the Department of Entomology of Szent István University (Sziu). Adults of *Psallus* species were identified by D. Korányi using characters of the exoskeleton and male genitalia following the keys of Wagner (1967) and Wyniger (2004). Photographs of habitus and femora (Fig. 1) were taken using a Sony XCD-SX90CR digital interface connected to a Zeiss Stemi 2000 stereomicroscope, those of the vesica (Fig. 2) using a Zeiss Imager A2 light microscope equipped with Axio Cam MRc5.

RESULTS

Among the 5536 heteropteran individuals collected during the study, 714 specimens (226 ♂♂, 488 ♀♀) were identified as *P. assimilis*. Further 354 specimens (73 nymphs, 191 ♂♂ and 90 ♀♀ damaged or teneral adults) of *Psallus* spp. were very similar to *P. assimilis* and likely represented this species, but they could not be unambiguously identified to species level. Collected specimens were deposited in the Hemiptera Collection of the Hungarian Natural History Museum (HNHM) and the insect collection of Department of Entomology, Sziu.

Material examined. Alkotás utca, 7.v.2015, 27 ♂♂, 32 ♀♀, 26.iv.2016, 43 ♀♀; Botanical Garden Buda, 7.v.2015, 13 ♂♂, 25 ♀♀, 26.iv.2016, 35 ♀♀; Csillebér, 25.v.2016, 8 ♂♂, 5 ♀♀,

22.vi.2016, 1 ♀; Diósd, 25.v.2016, 1 ♂, 2 ♀♀; Farkasvölgy, 25.v.2016, 3 ♂♂, 5 ♀♀; Gellért-hegy, 7.v.2015, 79 ♂♂, 91 ♀♀, 26.iv.2016, 1 ♀, 25.V.2016, 1 ♀; Haller park, 26.iv.2016, 20 ♀♀, 25.v.2016, 1 ♂, 5.v.2017, 1 ♂; Hegyalja út, 25.v.2016, 6 ♀♀; Hunyadi tér, 26.iv. 2016, 1 ♂, 6 ♀♀, 25.v.2016, 1 ♂, 5.v.2017, 4 ♂♂, 10 ♀♀; Hűvösvölgy, 25.v.2016, 2 ♀♀; Karolina út, 7.v.2015, 62 ♂♂, 80 ♀♀, 26.iv.2016, 2 ♂♂, 24 ♀♀, 25.v.2016, 1 ♂, 5.v.2017, 1 ♀; Keleti Pályaudvar, 26.iv. 2016, 2 ♂♂, 2 ♀♀; Ludovika tér, 5.v.2017, 1 ♀; Margit-sziget, 26.iv.2016, 3 ♂♂, 35 ♀♀; Mátyás tér, 26.iv.2016, 2 ♀♀, 5.v.2017, 1 ♀; Normafa, 25.v.2016, 2 ♀♀; Rácz Aladár út, 25.v.2016, 4 ♂♂, 15 ♀♀; Rákóczi tér, 26.iv.2016, 12 ♂♂, 9 ♀♀, 5.v.2017, 6 ♀♀; Róbert Károly körút, 26.iv.2016, 6 ♀♀, 5.v.2017, 9 ♀♀; Széchenyi-hegy, 25.v.2016, 7 ♀♀; Törökbálint, 25.v.2016, 1 ♀; Vérmező, 25.v.2016, 1 ♀; Zugligeti út, 25.v.2016, 1 ♂, 1 ♀.

Altogether, 20 males and 183 females were collected in April, 206 males and 304 females in May and only one female was found in June. For doubtfully identified (presumably *P. assimilis*) specimens, the corresponding values were 68 nymphs, 119 male and 58 female individuals in April and 5 nymphs, 72 male and 32 female individuals in May.

Other *Psallus* species in the same samples were *P. wagneri* Ossiannilsson, 1953 (Botanical Garden Buda, 26.iv.2016, 2 ♂♂; Csillebér, 25.v.2016, 1 ♂; Farkasvölgy, 25.v.2016, 1 ♂; Hegyalja út, 25.v.2016, 1 ♂), *P. perrisi* Mulsant & Rey, 1852 (Botanical Garden Buda, 26.iv.2016, 1 ♂; Csillebér, 25.v.2016, 1 ♂) and individuals representing either *P. perrisi* or *P. wagneri*, (Botanical Garden Buda, 26.iv.2016, 3 ♀♀; Csillebér, 25.v.2016, 3 ♀♀; Karolina út, 7.v.2015, 1 ♀; Széchenyi-hegy, 25.v.2016, 1 ♀) but doubtfully associated with either of these two species.

DISCUSSION

Distribution. *Psallus assimilis* was first reported from Great Britain (Stichel 1956–1958, Auke-

ma 1981). Later it was also found in Germany (Rieger 1972), Luxembourg (Reichling 1984), the Netherlands (Aukema 1986), France (Matocq 1989), Poland (Gorczyca 1990), Austria (Melber *et al.* 1991), Italy (Bacchi & Rizzotti Vlach 1994), Serbia (Protic 1999), Belgium and Sweden (Kerzhner & Josifov 1999), Czech Republic (Kment & Bryja 2001), Slovakia (Bryja & Kment 2002), Switzerland (Wyniger & Burckhardt 2003) and Spain (Pagola-Carte *et al.* 2006). *Psallus assimilis* was also mentioned from Finland (Stichel 1956–1958) and Denmark (Skipper 2017), though its presence in these countries still needs to be confirmed (Endrestøl & Ødegaard 2011).

Habitat and bionomics. *Psallus assimilis* prefers woody habitats (forests, forest edges and woodlands) and lives on *Acer campestre* (Rabitsch 2008, Friess 2011, Heckmann & Blöch-

linger 2011). It is univoltine and overwinters in the egg stage (Wachmann *et al.* 2004, Rabitsch 2008) on young twigs of the host plant (Aukema & Hermes 2009). It is zoophytophagous, reported as a predator of various insects including psyllids (Jerinić-Prodanović & Protić 2013). In the studied areas, adults are active from the end of April to the beginning of June.

Adult. The general appearance of the adults is shown in Figs. 1a–b. Length of body 3.3–3.9 mm. The Antenna yellowish, segment I with two setae. Corium, embolium and cuneus reddish orange, membrane brown. Tibiae yellow, with brown spines arising from brown spots. Tarsus yellowish, third tarsal segment dark (Figs. 1a–b). Ventral surface of metafemora with longitudinally arranged brown spots (Figs. 1c–d).

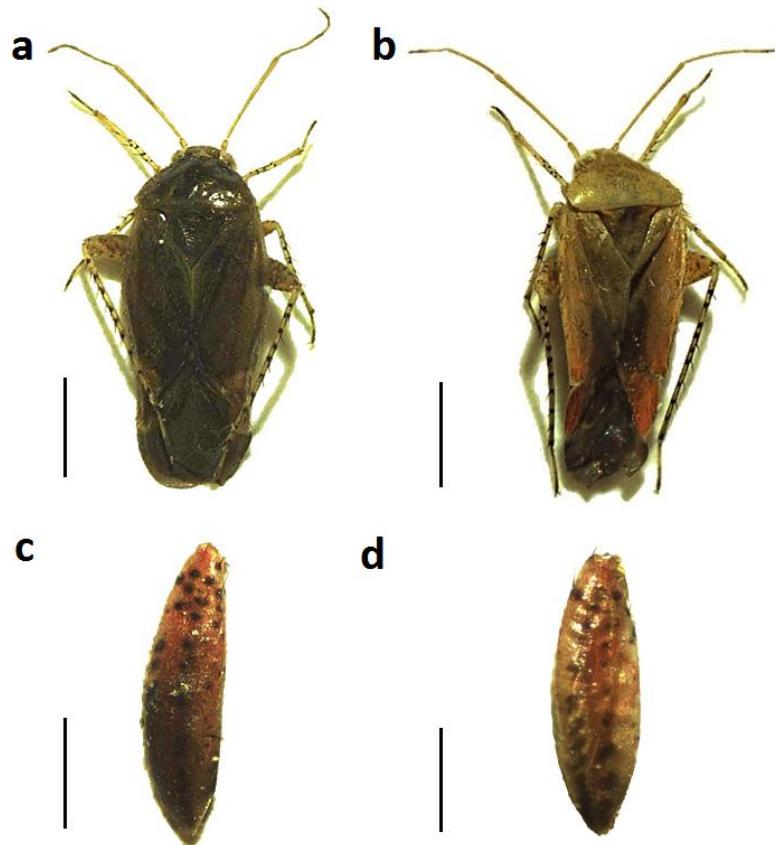


Figure 1. *Psallus assimilis* Stichel, 1956. a = male, dorsal view; b = female, dorsal view; c = male, ventral surface of metafemur; d = female, ventral surface of metafemur. Scale bars = 1 mm (Fig. 1a–b), 0.5 mm (Fig. 1c–d). (Photo: Dávid Korányi.)

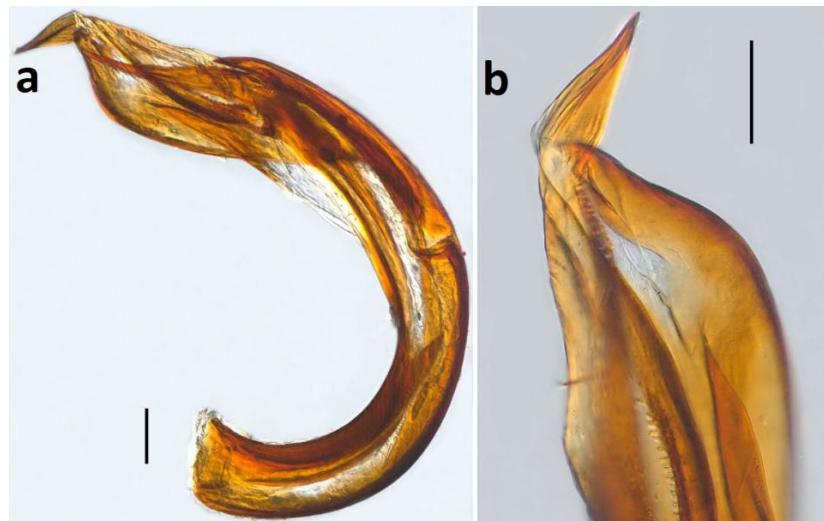


Figure 2. Cleared and dissected vesica of *Psallus assimilis* Stichel, 1956. a = ventral view; b = apex, magnified; scale bars = 0.1 mm. (Photo: Dávid Korányi.)

Male. Body elongate, head, scutellum and clavus orange brown, pronotum bright brown (Fig. 1a). Femora brownish, with yellowish apical part (Fig. 1c). Vesica C-shaped, basal lateral process long, straight, slightly surpassing apical margin of secondary gonopore, apical lateral process straight and widened (Figs. 2a–b).

Female. Body roundish, head, pronotum, scutellum and clavus yellowish red (Fig. 1b). Femora yellowish, with brown basal part (Fig. 1d).

The large number of individuals of *P. assimilis* collected during the present study suggests that this species is either autochthonous in Hungary (but has not been found yet due to the lack of intensive collecting from maple trees) or it is a recent invader which has already successfully established and it is present since several years. We have reexamined the *Psallus* spp. specimens in the Hemiptera Collection of HNHM and did not find any further specimens of *P. assimilis*. Since other congeners (*P. perrisi*, *P. wagneri*) were found in low abundance, *P. assimilis* can be considered as the dominant (most abundant) *Psallus* species in the canopy of *Acer campestre* in the studied region. Furthermore, based on our results, this species was one of the most common true bug species not only in urban forests (e.g. Csillebér, Hűvösvölgy, Széchenyi-hegy), but also in urban areas bounded by artificial surfaces (e.g. Alkotás

street, Karolina street, Rákóczi tér). Besides of the pollen of its host plant, aphids (*Periphyllus* spp., *Drepanosiphum* spp.) that occurred in large numbers in the canopy of *A. campestre* trees could serve as food for the species at these locations.

With the present new record, the number of *Psallus* species recorded from Hungary is brought to 24; accordingly, *Psallus* is the most species-rich true bug genera in Hungary.

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